

# Mishaps in school labs reveal lack of safety

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**GENOA, Ill.** - In a flash, the routine high school chemistry experiment turned to chaos.

An alcohol-fueled fireball shot into the classroom, searing the skin of three junior honor students in the front row. They took the brunt of the blast on their faces, necks, arms, hands and legs.

The teacher pulled burning jeans off one of the girls; scorched skin fell from the boy's face. The rest of the class scrambled for the door, leaving burned backpacks and books behind.

The fire at Genoa-Kingston High School in October was a horrible accident, but it was not isolated. Across the country, at least 150 students have been seriously injured in school lab accidents in the past four years.

But the number is almost certainly much higher, according to interviews with researchers, school officials and insurance companies.

Researchers found that more than 70 percent of high school science teachers in North Carolina had never received safety training, although they added that serious injuries are very rare, and they do not describe this as a "panic situation."

As schools try to meet tough new science education standards set by the National Academy of Sciences in 1996, students are spending more time in laboratories. Some are crowded. Some have teachers with no safety training. Some are in 19th-century buildings ill-equipped for 21st-century science.

"Before, most kids were reading out of textbooks, but the new federal science standards absolutely, strongly advocate hands-on, inquiry-based science," said Kenneth Roy, who chairs an advisory board on science safety for the National Science Teachers Association. "What this means is, you have to have safety concerns as job one, but some schools don't."

And while teachers are protected in the workplace by state laws, students are not covered by those laws. There is little regulation of school labs, and no government or private agency collects official data on accidents that happen there. As a result, the exact number of accidents is unknown.

Almost all of the accidents and injuries could have been prevented with simple safety measures, experts said. But many teachers are unaware of the dangers, and there is no formal system to share information on accidents so teachers can learn from others' mistakes.

Yet they occur often enough to be considered a serious problem, according to safety experts and insurers who have paid millions of dollars to settle claims.

"There have been some terrible accidents and injuries that are just absolutely gross," said John Wilson, executive director of the Schools Excess Liability Fund in California, which recently paid more than \$1 million in one case involving a chemistry accident and more than \$3 million in another.

A settlement is pending in a third accident, involving a Riverside, Calif., girl who was burned over 20 percent of her body. She is getting treatment to reduce scarring and improve the use of her badly burned right arm.

There is evidence the number of accidents has risen since schools began adopting the new teaching standards. In Iowa, there were 674 accidents in the three school years from fall 1990 through spring 1993, but more than 1,000 in the following three years, said Jack Gerlovich, who teaches science safety at Drake University.

The increase came after Iowa schools began adopting an early version of the new standards, he said. The number of lawsuits soared, too, from 96 to 245. Gerlovich said he suspects the same thing is happening in other states.

"I think this was the tip of an iceberg," Gerlovich said.

If accurate statistics were gathered, he said, "I think the actual numbers would be much, much higher, but it's the kind of problem nobody wants to face."

### **Teen disfigured for life**

When the swoosh of fire hit Autum Burton, she was returning to her seat in her chemistry class after taking a closer look at the colors of the flames in the six petri dishes on the teacher's table. In an instant, she was engulfed in flames.

"I could feel it eating at me and I could smell my skin burning," she recalled recently. "I was on the floor trying to get this off with my hands."

By the time someone finally managed to wrap her in a blanket and put out the fire, she was burned over almost half her body: face, neck, chest, arms and legs.

Burton, 19, now attends Columbia College in Chicago. Despite eight skin-graft operations and three laser treatments to diminish scarring on her face, she will be disfigured for the rest of her life.

The accident happened two years ago at Lakeview High School in Battle Creek, Mich. Just two months earlier, a 16-year-old girl was severely burned in a similar accident that had happened about 40 miles away, at Waverly High School near Lansing. In both cases, the experiments involved methyl alcohol.

A volatile chemical that ignites easily, methyl alcohol often is involved in the most catastrophic accidents. In recent years, it also has caused flash fires at schools in Santa Clarita and Riverside, Calif.; Genoa, Ill.; Midland, Texas; New Berlin, Wis., and Washington.

If the teacher does not use an exhaust system, leaves the cap off the alcohol jug or pours too much into the dishes, fumes can build up and, if exposed to flame, create a flash fire. If the fumes come from an open bottle, the explosion can eject the liquid, followed by a ball of fire.

"You get a flame-thrower effect," said Steve Weston, a lawyer representing Burton and the student from Lansing. "It jettisons fluid from the bottle, whose opening is pointed like a gun right at these students."

The fire marshal in Battle Creek determined Burton's accident could have been prevented if an exhaust system in the room had been used to draw away fumes. And the injuries might have been minimized if the teacher had used a plastic shield or required the students to wear goggles.

In many cases, school officials believed such protection was unnecessary when students were watching, rather than participating in, an experiment -- even though most states have laws requiring eye protection under such circumstances.

But a high percentage of science teachers have never had safety training, and in some cases, the schools didn't even own the necessary safety equipment, experts said.

### **Many N.C. teachers untrained**

Gerlovich, the Drake University researcher, has found, for example, that more than 70 percent of high school science teachers in North Carolina had never received safety training. He said surveys in 17 other states found an average of 55 percent to 65 percent of teachers had never been trained in safety.

But lab safety in North Carolina was "fairly typical" of that in most states, Gerlovich said.

"I don't think it's a panic situation," he said. "But I do think there's reason for concern."

Gerlovich says he's begun to collect safety information on South Carolina as well, but has not yet analyzed it.

Jake Brown, former science coordinator for the N.C. Department of Public Instruction, says that during his 26 years in that job, there was usually no more than one serious injury resulting from a science experiment each year. Students have been burned by acids and cut by glass shards from exploding beakers, he said, but serious injuries are very rare.

"Could we do more (to prevent injuries)? Yes, we could always do more," said Brown, now an associate professor of science education at Mt. Olive College. "But are we doing a good job with laboratory safety? Yes, I think we do a pretty good job."

Brown said North Carolina has significantly improved laboratory safety during the past 30 years. The state has worked hard to provide safety training for teachers, and to ensure that new science labs are safely designed, he said. A state law, meanwhile, requires that students wear eye protection during potentially dangerous experiments.

Still, Brown said, some labs lack fire extinguishers and apparatus to vent dangerous fumes.

"Some of our older schools are not equipped as well as they should be for safety," said Brown, who edits the newsletter of the N.C. Science Teachers Association.

Alan Paradise, assistant principal of East Bakersfield High School in California, said he never imagined students were in serious jeopardy in the chemistry lab -- until a glass bottle of methanol exploded three years ago, sending a teacher and 22 students to a hospital with cuts, headaches and nausea. After that, the district began requiring shields and goggles and sent teachers to safety training.

"We had done this demonstration for years and years without problems," Paradise said. "We're fortunate nothing worse happened."

The lack of training is alarming for another reason, experts say: Many teachers don't know how to safely store chemicals, which can cause dangerous reactions if they accidentally mix. Some teachers store chemicals alphabetically instead of by chemical type, or they keep them beyond their safe life span.

In Rogersville, Tenn., in March, old, unlabeled bottles of chemicals being removed from a school accidentally leaked and mixed, causing an explosion and fire. No one was hurt.

### **Lives changed forever**

Eight months after the Genoa-Kingston flash fire, Rachel Anderson, Eric Baenziger and Kara Butts are still recovering from their burns. Kara and Eric wear pressure garments 24 hours a day to reduce scarring, and both will require skin grafts, said their lawyer, Michael Alesia. The students declined to be interviewed.

All eventually returned to school. Administrators are trying to sort out what happened and whether they should change their chemistry procedures. The teacher was not disciplined and remains on staff, according to the school's superintendent, Richard Leahy. The teacher did not respond to a request for an interview, but Leahy said, "No one agonized more than this man over hurting his students. He's a retired professional chemist; he teaches because he loves it."

The Genoa-Kingston case illustrates a lack of school-safety oversight common in most states, where laws, if they exist, are almost never enforced in schools. Aside from eye-protection requirements, few laws are aimed specifically at students. School labs rarely undergo inspections from state or federal authorities and there usually are no requirements that accidents be reported to anyone outside the school.

"The schools are pretty much left on their own," said James Kaufman, director of the Massachusetts-based Laboratory Safety Institute, a nonprofit agency that promotes school lab safety. "They all assume these are smart people, they have a science degree, they know how to do this properly. This is not true in some significant measure."

"You send your kids to school because you think they're safe. It burns me that (accidents) are happening when they're preventable," said Roy, of the National Science Teachers Association.

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*Some N.C. information reported by staff writer Ames Alexander*